Πρόγραμμα Μεταπτυχιακών Σπουδών Εξειδίκευσης
του Τμήματος Ελληνικής Φιλολογίας του Δημοκριτείου Πανεπιστημίου Θράκης
σε συνεργασία με το
ΕΚΕΦΕ Δημόκριτος – Ινστιτούτο Πληροφορικής και Επικοινωνιών
με τίτλο: «Εξειδίκευση στις Τ.Π.Ε. και Ειδική Αγωγή – Ψυχοπαιδαγωγική της ένταξης»

ΚΙΝΗΤΙΚΟΣ ΓΡΑΜΜΑΤΙΣΜΟΣ, ΦΥΣΙΚΗ ΔΡΑΣΤΗΡΙΟΤΗΤΑ ΚΑΙ ΦΥΣΙΚΗ ΚΑΤΑΣΤΑΣΗ ΠΑΙΔΙΩΝ ΜΕ ΚΙΝΗΤΙΚΕΣ ΔΥΣΚΟΛΙΕΣ

PHYSICAL LITERACY, PHYSICAL ACTIVITY AND PHYSICAL FITNESS IN CHILDREN WITH MOVEMENT DIFFICULTIES

της Σταγιάννη Λυδίας

Μεταπτυχιακή διατριβή που υποβάλλεται

στην τριμελή επιτροπή για την απόκτηση του μεταπτυχιακού τίτλου του
Προγράμματος Μεταπτυχιακών Σπουδών Εξειδίκευσης
του Τ.Ε.Φ-Δ.Π.Θ. σε συνεργασία με το Ε.Κ.Ε.Φ.Ε. Δημόκριτος – Ινστιτούτο Πληροφορικής και Επικοινωνιών
με τίτλο: «Εξειδίκευση στις Τ.Π.Ε. και Ειδική Αγωγή – Ψυχοπαιδαγωγική της ένταξης»

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Κομοτηνή/Αθήνα 2023

ΚΙΝΗΤΙΚΟΣ ΓΡΑΜΜΑΤΙΣΜΟΣ, ΦΥΣΙΚΗ ΔΡΑΣΤΗΡΙΟΤΗΤΑ ΚΑΙ ΦΥΣΙΚΗ ΚΑΤΑΣΤΑΣΗ ΠΑΙΔΙΩΝ ΜΕ ΚΙΝΗΤΙΚΕΣ ΔΥΣΚΟΛΙΕΣ

ΠΕΡΙΛΗΨΗ

Ένα σημαντικό ποσοστό παιδιών σχολικής ηλικίας έρχεται αντιμέτωπο με κινητικές δυσκολίες, οι οποίες επηρεάζουν αρνητικά πολλούς τομείς της καθημερινής ζωής. Σκοπός της παρούσας εργασίας ήταν η αξιολόγηση του κινητικού γραμματισμού (ΚΓ), της φυσικής δραστηριότητας (ΦΔ) και της καρδιοαναπνευστικής ικανότητας (ΚΙ) παιδιών με κινητικές δυσκολίες και η μελέτη ενδεχόμενων διαφορών με τα παιδιά ΤΑ αναφορικά με τις παραπάνω παραμέτρους. Στην έρευνα έλαβαν μέρος 97 παιδιά, ηλικίας 11-12 ετών (ΜΟ=11.57± .49 έτη), που φοιτούσαν σε δημοτικά σχολεία της Αττικής. Η εκτίμηση ενδεχόμενων κινητικών δυσκολιών των συμμετεχόντων έγινε με τη λίστα ελέγχου MABC, ενώ για την εκτίμηση των παραμέτρων ενδιαφέροντος χρησιμοποιήθηκαν: το Physical Activity Questionnaire for Children (για τη ΦΔ), η δοκιμασία παλίνδρομου τρεξίματος 20μ. (για την ΚΙ) και το Physical Literacy for Children-Questionnaire(για τον ΚΓ). Σύμφωνα με τα αποτελέσματα, 15.5% των συμμετεχόντων παρουσίασαν μέτριες κινητικές δυσκολίες και 16.5% σοβαρές. Τα παιδιά με κινητικές δυσκολίες είχαν σημαντικά χαμηλότερα επίπεδα ΦΔ ($F=16.16$, $p < .001$, $\eta^2= .26$), ΚΙ ($F=11.24$, $p< .001$, $\eta^2=.20$) και ΚΓ ($F=10.13$, $p < .001$, $\eta^2= .18$), σε σχέση με τους συνομηλίκους τους τυπικής ανάπτυξης (ΤΑ). Ειδικότερα για τους επιμέρους τομείς του ΚΓ, στατιστικά σημαντική υπεροχή των παιδιών ΤΑ διαπιστώθηκε στον κινητικό ($F=16.72$, $p< .001$, $\eta^2=.26$) και τον ψυχικό τομέα ($F=3.75$, $p= .027$, $\eta^2=.07$). Συνολικά, τα ευρήματα της παρούσας μελέτης αναδεικνύουν τα χαμηλά επίπεδα των παιδιών με κινητικές δυσκολίες σε τρεις, σημαντικές για την ποιότητα ζωής, παραμέτρους και προβάλλουν την ανάγκη διαμόρφωσης κινητικών προγραμμάτων με γνώμονα τα ατομικά χαρακτηριστικά και τις ανάγκες των συμμετεχόντων, ώστε να ενισχυθεί η συμμετοχή των παιδιών με κινητικές δυσκολίες σε ΦΔ και να αναπτυχθεί ο ΚΓ τους.

Λέξεις κλειδιά: Κινητική επιδεξιότητα, φυσική δραστηριότητα, φυσική κατάσταση, καρδιοαναπνευστική ικανότητα, κινητικός γραμματισμός, κινητικές δυσκολίες, Αναπτυξιακή Διαταραχή Συντονισμού

ΚΕΦΑΛΑΙΟ VI. ΒΙΒΛΙΟΓΡΑΦΙΚΕΣ ΑΝΑΦΟΡΕΣ

Aaron, D. J., Kriska, A. M., Dearwater, S. R., Anderson, R. L., Olsen, T. L., Cauley, J. A., et al. (1993). The epidemiology of leisure physical activity in an adolescent population. *Medicine & Science in Sports & Exercise, 25*, 847–853.

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms and profiles*. Burlington, VT: University of Vermont Department of Psychiatry.

Actical Instruction Manual. (2006). *Actical, Version 2.0.* Oregon, USA: Mini Mitter Company Inc Respironics.

Afthentopoulou, A. E., Kaioglou, V., & Venetsanou, F. (2017). Overweight and obesity prevalence in young children living in Athens. *Public Health Open Journal*, 2(1), 26-32.

Ajzen, I. (2006). *Behavioral Interventions based on the Theory of Planned Behavior,* Vol.1 http://www.people.umass.edu/aizen/pdf/tpb.intervention.pdf, (accessed February, 2023).

Allen, S., & Casey, J. (2017). Developmental coordination disorders and sensory processing and integration: Incidence, associations and co-morbidities. *British Journal of Occupational Therapy*, *80*(9), 549-557.

Allender, S., Cowburn, G. & Foster, C. (2006) Understanding participation in sport and physical activity among children and adults: a review of qualitative studies. *Health Education Research: Theory & Practice*, 21, 826–835.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders, 4th ed.* Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders, 5th ed.* Arlington: American Psychiatric Association,

American Thoracic Society (ATS) (2002). ATS statement: Guidelines for the six-minute walk test. *American Journal of Respiratory and Critical Care Medicine*, 166,111–117.

Anderson, C. B., Masse, L. C., Zhang, H., Coleman, K. J., & Chang, S. (2009). Contribution of athletic identity to child and adolescent physical activity. *American Journal of Preventive Medicine*, 37, 220–226.

APA. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Publishing.

Arbour-Nicitopoulos, K. P., Bremer, E., Leo, J., & Wright, F. V. (2022). A pragmatic approach to measuring physical literacy and behavioural outcomes in youth with and without disabilities. *Leisure/Loisir*, 1-25.

Asonitou, K., Koutsouki, D., Kourtessis, T. & Charitou, S. (2012). Motor and cognitive performance differences between children with and without developmental coordination disorder (DCD), *Research in Developmental Disabilities* 33, 996–1005.

ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories (2002). ATS statement: guidelines for the Six-minute Walk Test. *American Journal of Respiratory and Critical Care Medicine 166*, 111–117.

Baniasadi, T., Khajeaflaton Mofrad, S., & ShafaeianFard, F. (2022). Associations between Physical Activity with Self-Esteem and Perceived Motor Competence among Children with Developmental Coordination Disorder. *Journal of Modern Psychology*, *2*(2), 1-10.

Bardid, F., Rudd, J. R., Lenoir, M., Polman, R., & Barnett, L. M. (2015). Cross-cultural comparison of motor competence in children from Australia and Belgium. *Frontiers in Psychology*, *6*, 964.

Barfield, J. P., Rowe, D. A., & Michael, T. J. (2004). Interinstrument consistency of the Yamax Digiwalker Pedometer in elementary school-aged children. *Measurement in Physical Education and Exercise Science, 8,* 109–116.

Barnett, A. L., Dawes, H., & Wilmut, K. (2013). Constraints and facilitators to participation in physical activity in teenagers with developmental co-ordination disorder: an exploratory interview study. *Child: Care, Health and Development*, *39*(3), 393-403

Barnett, L., Hinkley, T., Okely, A., & Salmon, J. (2013). Child, family and environmental correlates of children's motor skill proficiency. *Journal of Science and Medicine in Sport, 16*(4), 332–336.

Barnett, L. M., Mazzoli, E., Hawkins, M., Lander, N., Lubans, D. R., Caldwell, S., Comis, P., Keegan, R. J., Cairney, J., Dudley, D., Stewart, R. L., Long, G., Schranz, N., Brown, T. D., & Salmon, J. (2020). Development of a self-report scale to assess children's perceived physical literacy. *Physical Education and Sport Pedagogy*, 1–26.

Barnett, L. M., Mazzoli, E., Bowe, S. J., Lander, N., & Salmon, J. (2022). Reliability and validity of the PL-C Quest, a scale designed to assess children's self-reported physical literacy. *Psychology of Sport and Exercise*, *60*, 102164.

Batey, C. A., Missiuna, C. A., Timmons, B. W., Hay, J. A., Faught, B. E., & Cairney, J. (2014). Self-efficacy toward physical activity and the physical activity behavior of children with and without Developmental Coordination Disorder. *Human Movement Science*, *36*, 258-271.

Belton, S., Connolly, S., Peers, C., Goss, H., Murphy, M., Murtagh, E., et al. (2022). Are all domains created equal? An exploration of stakeholder views on the concept of physical literacy. *BMC Public Health*, *22*(1), 1-15.

Bhat, A. N., & Galloway, J. C. (2006). Toy-oriented changes during early arm movements: Hand kinematics. *Infant Behavior and Development*, *29*(3), 358-372.

Blank, R., Smits-Engelsman, B., Polatajko, H., & Wilson, P. (2012). European Academy for Childhood Disability (EACD): Recommendations on the definition, diagnosis and intervention of developmental coordination disorder (long version). *Developmental Medicine & Child Neurology, 54*, 54-93.

Bolgla, L. A., & Keskula, D. R. (1997). Reliability of lower extremity functional performance tests*. Journal of Orthopaedic & Sports Physical Therapy*, 26(3), 138–142.

Borg, G. (1998). *Borg's perceived exertion and pain scales*. Human kinetics.

Bruce, R., Kusumi, F., & Hosmer, D. (1973). Maximal oxygen intake and nomographic assessment of functional aerobic impairment in cardiovascular disease. *American Heart Journal*, *85*(4), 546-562.

Bruininks, R. (1978). *The Bruininks–Oseretsky Test of motor proficiency*. Circle Pines, MN: American Guidance Service.

Bruininks, R.H., Bruininks, B.D. (2005). *Bruininks–Oseretsky Test of Motor Proficiency, second edition (BOT-2)*. San Antonio, TX: Pearson.

Brown, D. M., Dudley, D. A., & Cairney, J. (2020). Physical literacy profiles are associated with differences in children's physical activity participation: A latent profile analysis approach. *Journal of Science and Medicine in Sport*, *23*(11), 1062-1067.

Γιαννάκης, Χ. Δ. (2005). *Καρδιοαναπνευστική ικανότητα παιδιών 10-12 ετών με διαφορετικά επίπεδα κινητικών δεξιοτήτων*. Αδημοσίευτη πτυχιακή εργασία. Πανεπιστήμιο Θεσσαλίας, Τρίκαλα.

Cantell, M., & Crawford, S. G. (2008). Physical fitness and health indices in children, adolescents and adults with high or low motor competence. *Human Movement Science*, *27*(2), 344-362.

Cairney, J., Hay, J.A., Faught, B.E., Wade, T.J., Corna, L., & Flouris, A. (2005). Developmental coordination disorder generalized self-efficacy toward physical activity, and participation in organized and free play activities. *The Journal of Pediatrics, 147(4), 515-520.*

Cairney, J., Hay, J., Mandigo, J., Wade, T., Faught, B. E., & Flouris, A. (2007). Developmental coordination disorder and reported enjoyment of physical education in children. *European Physical Education Review*, 13(1), 81–98.

Cairney, J., Hay, J. A., Veldhuizen, S., Missiuna, C., & Faught, B. E. (2010). Developmental coordination disorder, sex, and activity deficit over time: a longitudinal analysis of participation trajectories in children with and without coordination difficulties. *Developmental Medicine & Child Neurology*, *52*(3), e67-e72.

Cairney, J., Veldhuizen, S., King-Dowling, S., Faught, B. E., & Hay, J. (2017). Tracking cardiorespiratory fitness and physical activity in children with and without motor coordination problems. *Journal of Science and Medicine in Sport*, *20*(4), 380-385.

Calame, E., Reinders, H., Smits, B. C. M., Schoemaker, M. M., Volman, M. J. M., de Kloet, A. (2009). Hoe ik vind dat ik het doe vragenlijst: Vragenlijst motorische

competentiebeleving (How am I doing questionnaire: A questionnaire to investigate perceived motor competence). *Unpublished manuscript.*

Canada's Physical Literacy Consensus Statement (2015). *International Physical Literacy Conference*, Vancouver, Canada. Ανακτήθηκε 23 Φεβρουαρίου, 2023, από https://www.participaction.com/sites/default/files/downloads/Participaction-CanadianPhysicalLiteracy Consensus_0.pdf

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Reports*, *100*(2), 126.

Cermak, SH., Gubbay, SS., Larkin, D. (2002). What is developmental coordination disorder? In: SA. Cermak, D. Larkin. (Eds). *Developmental coordination disorder* (pp. 2–22). Albany: Singular Publishing Group.

Cermak, S. A. (2007). *Physical Activity and Sedentary Behavior-Questionnaire*. NIH grant National Institute for Child and Human Development.

Cermak, S. A., Katz, N., Weintraub, N., Steinhart, S., Raz-Silbiger, S., Munoz, M., & Lifshitz, N. (2015). Participation in physical activity, fitness, and risk for obesity in children with developmental coordination disorder: a cross-cultural study. *Occupational Therapy International*, *22*(4), 163-173.

Chagas, D. V., & Batista, L. A. (2017). Comparison of health outcomes among children with different levels of motor competence. *Human Movement*, *18*(2), 56-61.

Chamari, K., Chaouachi, A., Hambli, M., Kaouech, F., Wisløff, U., & Castagna, C. (2008). The 5-jumps for distance as a field test to assess lower limbs explosive-power in soccer players. *Journal of Strength and Conditioning Research*, *22*(3), 944–950.

Clanchy, K. M., Tweedy, S. M., Boyd, R. N., & Trost, S. G. (2011). Validity of accelerometry in ambulatory children and adolescents with cerebral palsy. *European Journal of Applied Physiology*, *111*(12), 2951–2959.

Cleaton, M. A., Tal-Saban, M., Hill, E. L., & Kirby, A. (2021). Gender and age differences in the presentation of at-risk or probable Developmental Coordination Disorder in adults. *Research in Developmental Disabilities*, *115*, 104010.

Cocks, N., Barton, B., & Donelly, M. (2009). Self-concept of boys with Developmental Coordination Disorder. *Physical & Occupational Therapy in Pediatrics*, *29*, 6–22.

Cohen, J. (1998). *Statistical Power Analysis for the Behavioral Sciences* 2nd edn. New York, NY: Academic Press.

Cole, T. J., Bellizzi, M. C., Flegal, K. M., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. *Bmj*, *320*(7244), 1240.

Cools, W., De Martelaer, K., Samaey, C., & Andries, C. (2009). Movement skill assessment of typically developing preschool children: A review of seven movement skill assessment tools. *Journal of Sports Science & Medicine*, *8*(2), 154.

Crocker, P.R.E., Bailey, D.A., Faulkner, R.A., Kowalski, K.C., & McGrath, R. (1997). Measuring general levels of physical activity: Preliminary evidence for the Physical Activity Questionnaire for Older Children. *Medicine & Science in Sports & Exercise*, *29*(10), 1344-1349.

Crocker, P. R., Eklund, R. C., & Kowalski, K. C. (2000). Children's physical activity and physical self-perceptions. *Journal of Sports Sciences*, *18*(6), 383–394

Das Virgens Chagas, D., & Batista, L. A. (2016). Associations between motor coordination and BMI in normal weight and overweight/obese adolescents. *Journal of Human Growth and Development*, *26*(3), 380-384.

De Meester, A., Stodden, D., Goodway, J., True, L., Brian, A., Ferkel, R., & Haerens, L. (2018). Identifying a motor proficiency barrier for meeting physical activity guidelines in children. *Journal of Science and Medicine in Sport*, *21*(1), 58-62.

Denysschen, M., Coetzee, D., & Smits-Engelsman, B. C. (2021). Children with Poor Motor Skills Have Lower Health-Related Fitness Compared to Typically Developing Children. *Children*, *8*(10), 867.

Dimitropoulou, D., Kourtessis, T., Tsigilis, N., Mouratidou, A., Ellinoudis, T., & Evangelinou, C. (2019). Concurrent validity of the Movement Assessment Battery for Children Checklist-2. *European Psychomotricity Journal*, *11*(1), 19-38.

Duncan, P. W., Weiner D. K., Chandler. J., & Studenski. S., (1990). Functional Reach: A New Clinical Measure of Balance. *Journal of Gerontology, 45*(6), 192–197.

Dunford, C., Missiuna, C., Street, E., & Sibert, J. (2005). Children's perceptions of the impact of developmental coordination disorder on activities of daily living. *British Journal of Occupational Therapy*, *68*(5), 207-214.

Dunn, W., Little, L., Dean, E., Robertson, S., & Evans, B. (2016). The state of the science on sensory factors and their impact on daily life for children: A scoping review. *OTJR: Occupation, Participation and Health*, *36*(2_suppl), 3S-26S.

Ελληνούδης, Θ. (2001). *Η επίδραση του παράγοντα ηλικία στην ανίχνευση και αξιολόγηση των κινητικών δυσκολιών σε παιδιά δημοτικού σχολείου.* Αδημοσίευτη Μεταπτυχιακή Διατριβή. Δημοκρίτειο Πανεπιστήμιο Θράκης, Κομοτηνή.

Ellinoudis, T., Kourtessis, T., Kiparissis, M., & Papalexopoulou, N. (2008). Κινητική Αδεξιότητα σε Παιδιά Ηλικίας 9-12 Ετών στην Ελλάδα-Μια Επιδημιολογική Μελέτη. *Inquiries in Sport & Physical Education*, *6*(3), 280-289.

Ellinoudis, T., Evaggelinou, C., Kourtessis, T., Konstantinidou, Z., Venetsanou, F., & Kambas, A. (2011). Reliability and validity of age band 1 of the Movement Assessment Battery for Children–Second Edition. *Research in Developmental Disabilities*, *32*(3), 1046-1051.

Ellis, K. J., Shypailo, R. J., Pratt, J. A., & Pond, W. G. (1994). Accuracy of dual-energy x-ray absorptiometry for body composition measurements in children. *The American Journal of Clinical Nutrition, 60*(5), 660–665.

Enright, P. L. (2003). The six-minute walk test. *Respiratory Care*, *48*(8), 783-785.

Farhat, F., Masmoudi, K., Cairney, J., Hsairi, I., Triki, C., & Moalla, W. (2014). Assessment of cardiorespiratory and neuromotor fitness in children with developmental coordination disorder. *Research in Developmental Disabilities*, *35*(12), 3554-3561.

Farhat, F., Hsairi, I., Baiti, H., Cairney, J., Mchirgui, R., Masmoudi, K., et al. (2015). Assessment of physical fitness and exercise tolerance in children with

developmental coordination disorder. *Research in Developmental Disabilities*, *45*, 210-219.

Faught, B. E., Rivilis, I., Klentrou, P., Cairney, J., Hay, J., & Liu, J. (2013). Submaximal oxygen cost during incremental exercise in children with developmental coordination disorder. *Research in Developmental Disabilities*, *34*(12), 4439-4446.

Ferguson, G. D., Aertssen, W. F., Rameckers, E. A., Jelsma, J., & Smits-Engelsman, B. C. (2014). Physical fitness in children with developmental coordination disorder: measurement matters. *Research in Developmental Disabilities*, *35*(5), 1087-1097.

Fisher, A., Saxton, J., Hill, C., Webber, L., Purslow, L., & Wardle, J. (2011). Psychosocial correlates of objectively measured physical activity in children. European *Journal of Public Health*, *21*(2), 145–150.

Foley, L., Prapavessis, H., Maddison, R., Burke, S., McGowan, E., & Gillanders, L. (2008). Predicting physical activity intention and behaviour in school-age children. *Pediatric Exercise Science*, *20*(3), 342–356.

Freitas, C.; Vasconcelos, M. O., & Botelho, M. (2014). Handedness and developmental coordination disorder in Portuguese children: study with the M-ABC test. *Laterality, 19*(6), 655-676.

Φράγκου, Δ., Γαλάνης, Π., & Παντελίδης, Π. Προσδιοριστές της παχυσαρκίας σε παιδιά ηλικίας 10–15 ετών. 83-92. Αδημοσίευτη μεταπτυχιακή εργασία. Πανεπιστήμιο Πειραιώς. Πειραιάς.

Ghorbani, S., Afshari, M., Eckelt, M., Dana, A., & Bund, A. (2021). Associations between physical activity and mental health in Iranian adolescents during the COVID-19 pandemic: An accelerometer-based study. *Children*, *8*(11), 1022.

Giagazoglou, P., Kokaridas, D., Sidiropoulou, M., Patsiaouras, A., Karra, C., & Neofotistou K. (2013). Effects of a trampo- line exercise intervention on motor performance and balance ability of children with intellectual disabilities. *Research in Developmental Disabilities, 34*(9)*,* 2701–2707.

Gliner, J., Morgan, G., Leech, N., Harmon, R. (2001). Problems with mull hypothesis significance testing. *Journal of American Academy of Child and Adolescent Psychiatry, 40*(2):250-252.

Gordon, R. S., Franklin, K. L., Baker, J. S., & Davies, B. (2006). Determination of aerobic work and power on a rope-braked cycle ergometer by direct measurement. *Applied Physiology, Nutrition, and Metabolism*, *31*(4), 392-397.

Gorozidis, G., Papaioannou, A., & Diggelidis, N. (2012). Physical educators' self-efficacy in the implementation of the new curriculum for the "New School-the School of the 21st century". *Inquiries in Sport & Physical Education*, *10*(2), 91–101.

Goyen, T. A., Lui, K., & Hummell, J. (2011). Sensorimotor skills associated with motor dysfunction in children born extremely preterm. *Early human development*, *87*(7), 489-493.

Haga, M. (2008). Physical fitness in children with movement difficulties. *Physiotherapy*, *94*(3), 253-259.

Haj-Sassi, R., Dardouri, W., Gharbi, Z., Chaouachi, A., Mansour, H., Rabhi, A., et al. (2011). Reliability and validity of a new repeated agility test as a measure of anaerobic and explosive power. *Journal of Strength and Conditioning Research*, *25*(2), 472–480.

Harris, S.R., Mickelson, E.C., Zwicker, J.G. (2013). *DSM-V*, *5th ed.* American Psychiatric Association

Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development*, *53*(1), 87.

Harter, S. (1985). *Manual for the Self-Perception Profile for Children*, Denver: University Press.

Harter, S. (2012). Self-perception profile for children: manual and questionnaires *(grades 3–8)*, *Denver, University of Denver*.

Hay, J. A. (1992). Adequacy in and predilection for physical activity in children. *Clinical Journal of Sport Medicine, 2*(3), 192–201.

Henderson S, Sugden D, (1992). *The Movement Assessment Battery for Children*. San Antonio, TX: The Psychological Corporation.

Henderson, S. E., Sugden, D. A., & Barnett, A. L. (2007). *Movement assessment battery for children-2 second edition (Movement ABC-2).* London. UK The Psychological Corporation.

Hiraga, C. Y., Rocha, P. R. H., Ferracioli, M. D. C., Gama, D. T., & Pellegrini, A. M. (2014). Physical fitness in children with probable developmental coordination disorder and normal body mass index. *Revista Brasileira de Cineantropometria & Desempenho Humano*, *16*(2), 182-190.

International Physical Literacy Association (IPLA) (2017). *Definition of physical literacy*. Ανακτήθηκε 15 Μαρτίου 2023, από https://www.physical-literacy.org.uk/

Jelovčan, G., & Zurc, J. (2016). Preschool children's results in movement ABC tests: differences between girls and boys in movement deficit. / Doseki predolskih otrok na testih ABC gibanja: razlike med deklicami in dečki v primanjkljajih na gibalnem področjuxad. *Annales Kinesiologiae, 7*(1), 3-19.

Junaid, K. A., & Fellowes, S. (2006). Gender differences in the attainment of motor skills on the movement assessment battery for children. *Physical & Occupational Therapy in Pediatrics*, *26*(1-2), 5-11.

Kadesjo, B., & Gillberg, C. (1999). Developmental coordination disorder in Swedish 7-year-old children. *Journal of the American Academy of Child & Adolescent Psychiatry*, *38*(7), 820-828.

Καϊόγλου, Β., Μπότη, Ν., Νεοφωτίστου, Ε., Κιούση, Φ., Βενετσάνου, Φ. (2022). The physical literacy in children questionnaire: Cross-cultural adaptation and internal consistency in Greek population. *30 International Congress of Physical Education and Sport Science*, DPESS, DUTH. Komotini, 20-22 May.

Kaioglou, V., Dania, A., & Venetsanou, F. (2020). How physically literate are children today? A baseline assessment of Greek children 8-12 years of age. *Journal of Sports Sciences*, *38*(7), 741-750.

Karandaidou, M. (2005). *Value orientations in the physical education lesson: Curriculum programs and teachers' perceptions* (Doctoral dissertation, Aristotle University).

Katartzi, E. S., & Vlachopoulos, S. P. (2011). Motivating children with developmental coordination disorder in school physical education: The self-determination theory approach. *Research in Developmental Disabilities*, *32*(6), 2674-2682.

Kaufman, A. S., & Kaufman, N. L. (2004). *Kaufman Brief Intelligence Test (2nd ed.).* Circle Pines, MN, USA: AGS Publishing.

Kendall, F.P., McCreary, E.K. and Provance, P.G. (1993). *Muscle Testing and Function. 4th Edition*, Lippincott, Williams and Wilkins, Philadelphia.

Kimm, S. Y., Glynn, N. W., Obarzanek, E., Kriska, A. M., Daniels, S. R., Barton, B. A., & Liu, K. (2005). Relation between the changes in physical activity and body-mass index during adolescence: a multicentre longitudinal study. *The Lancet*, *366*(9482), 301-307.

King-Dowling, S., Rodriguez, C., Missiuna, C., Timmons, B. W., & Cairney, J. (2018). Health-related Fitness in Preschool Children with and without Motor Delays. *Medicine and Science in Sports and Exercise*, *50*(7), 1442-1448.

King-Dowling, S., Kwan, M. Y., Rodriguez, C., Missiuna, C., Timmons, B. W., & Cairney, J. (2019). Physical activity in young children at risk for developmental coordination disorder. *Developmental Medicine & Child Neurology*, *61*(11), 1302-1308.

Kipard ,E.J., Shilling, F. (2007). *Body coordination test for children [in German]*. Göttingen: Hogrefe.

Kita, Y; Suzuki, K.; Hirata, S.; Sakihara, K.; Inagaki, M., & Nakai, A. (2016). Applicability of the Movement Assessment Battery for Children-Second Edition to Japanese children: A study of the Age Band 2. *Brain & Development, 38*(8):706-13.

Klavina, A., Ostrovska, K., & Campa, M. (2017). Fundamental movement skill and physical fitness measures in children with disabilities. *European Journal of Adapted Physical Activity*, *10*(1).

Koldoff, E. A., & Holtzclaw, B. J. (2015). Physical Activity Among adolescents with cerebral palsy: an integrative review. *Journal of Pediatric Nursing, 30*(5)*,* e105-e117.

Kourtessis, T., Tzetzis, G., Kioumourtzoglou, E., & Mavromatis, G. (2001). The effects of an intensive recreational intervention program on children with movement difficulties. *New Zealand Journal of Disability Studies, 9,* 120-139.

Kowalski, K. C., Crocker, P. R., & Faulkner, R. A. (1997). Validation of the physical activity questionnaire for older children. *Pediatric Exercise Science, 9*(2), 174-186.

Kowalski, K. C., Crocker, P. R., & Donen, R. M. (2004). The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. *College of kinesiology, University of Saskatchewan*, *87*(1), 1-38.

Kwan, M. Y., Cairney, J., Hay, J. A., & Faught, B. E. (2013). Understanding physical activity and motivations for children with developmental coordination disorder: an investigation using the theory of planned behavior. *Research in Developmental Disabilities*, *34*(11), 3691-3698.

Larkin, D., & Hands, B. (2002). Physical fitness and developmental coordination disorder. In *Developmental Coordination Disorder* (pp. 172-184). Singular Publishing Group.

Leger, L. A., & Lambert, J. (1982). A maximal multistage 20 m shuttle run test to predict VO2 max. *European Journal of Applied Physiology, 49*(1), 1–12.

Le´ger, L. A., Mercier, D., Gadoury, C., & Lambert, J. (1988). The multistage 20 metre shuttle run test for aerobic fitness. *Journal of Sports Sciences*, 6, 93–101.

Li, A. M., Yin, J., Yu, C. C., Tsang, T., So, H. K., Wong, E., et al. (2005). The six-minute walk test in healthy children: Reliability and validity. *European Respiratory Journal*, *25*(6), 1057–1060.

Li, Y. C., Wu, S. K., Cairney, J., & Hsieh, C. Y. (2011). Motor coordination and health-related physical fitness of children with developmental coordination disorder: A three-year follow-up study. *Research in Developmental Disabilities*, *32*(6), 2993-3002.

Li, Y. C., Kwan, M. Y., King-Dowling, S., Rodriguez, M. C., & Cairney, J. (2021). Does physical activity and BMI mediate the association between DCD and internalizing problems in early childhood? A partial test of the Environmental Stress Hypothesis. *Human Movement Science*, *75*, 102744.

Li, M. H., Kaioglou, V., Ma, R. S., Choi, S. M., Venetsanou, F., & Sum, R. K. W. (2022). Exploring physical literacy in children aged 8 to 12 years old: a cross-cultural comparison between China and Greece. *BMC Public Health*, *22*(1), 1-11.

Loh, P. R., Piek, J. P., & Barrett, N. C. (2011). Comorbid ADHD and DCD: Examining cognitive functions using the WISC-IV. *Research in Developmental Disabilities*, *32*(4), 1260-1269.

Lopes, V. P., Rodrigues, L. P., Maia, J. A., & Malina, R. M. (2011). Motor coordination as predictor of physical activity in childhood. *Scandinavian Journal of Medicine & Science in Sports*, *21*(5), 663-669.

Loprinzi, P. D., Davis, R. E., & Fu, Y. C. (2015). Early motor skill competence as a mediator of child and adult physical activity. *Preventive Medicine Reports, 2,* 833–838.

Losse, A., Henderson, S. E., Elliman, D., Hall, D., Knight, E., & Jongmans, M. (1991). Clumsiness in children: Do they grow out of it? A 10-year follow-up study. *Developmental Medicine & Child Neurology*, *33*(1), 55–68.

Majnemer, A., Shikako-Thomas, K., Schmitz, N., Shevell, M., & Lach L. (2015). Stability of leisure participation from school-age to adolescence in individuals with cerebral palsy. *Research in Developmental Disabilities, 47,* 73–79.

Mandich, A. D., Polatajko, H. J., & Rodger, S. (2003). Rites of passage: Understanding participation of children with developmental coordination disorder. *Human Movement Science*, *22*(4-5), 583-595.

Markland, D., & Tobin, V. (2004). A modification of the behavioral regulation in exercise questionnaire to include an assessment of amotivation. *Journal of Sport & Exercise Psychology*, *26*(2), 191–196.

Marsh, H. W., Richards, G. E., Johnson, S., Roche, L., & Tremayne, P. (1994). Physical Self-Description Questionnaire: Psychometric properties and a miiltitrait-meltimethod analysis of relations to existing instruments. *Journal of Sport and Exercise Psychology*, *16*(3), 270-305.

McAuley, E., & Mihalko, S. (1998). Measuring exercise-related self-efficacy. In J. L. Duda (Ed.), *Advances in Sport and Exercise Psychology Measurement*, 371–390.

McDonncha, C., Watson, A. W. S., & McSweeney, T. D. J. (1999). Reliability of Eurofit Physical Fitness Items for Adolescent Males with and without Mental Retardation. *Adapted Physical Activity Quarterly, 16*(1), 86–95.

Meredith, M. D., & Welk, G. (Eds.). (2010). *Fitnessgram and Activitygram Test Administration Manual-Updated 4th Edition*. Human Kinetics.

Miller, E., & Miller-Kuhaneck, H. (2006). The relationship among sensory preferences, play preferences, motivation, and mastery in guiding children's play: A review of the literature, Part 2. *Sensory Integration Special Interest Section Quarterly, 29*(3), 1–4.

Miyahara, M. (2020). Physical literacy as a framework of assessment and intervention for children and youth with developmental coordination disorder: a narrative critical review of conventional practice and proposal for future directions. *International Journal of Environmental Research and Public Health*, *17*(12), 4313.

Morgan, G. A., Harmon, R. J., & Maslin-Cole, C. A. (1990). Mastery motivation: Definition and measurement. *Early Education and Development*, *1*(5), 318-339.

Naglieri, J. A., & Das, J. P. (1997). *Cognitive Assessment System*. Itasca, IL: Reverside Publishing.

Μπότη, Ν., Κιούση, Φ., Νεοφωτίστου, Ε., Καϊόγλου, Β., Βενετσάνου, Φ. (2022). *Test-retest reliability of the physical literacy in children questionnaire in 4-8-year-old children.* 30 International Congress of Physical Education and Sport Science, DPESS, DUTH. Komotini, 20-22 May.

Nascimento, R. O., Ferreira, L. F., Goulardins, J. B., Freudenheim, A. M., Marques, J. C. B., Casella, E. B., & Oliveira, J. A. (2013). Health-related physical fitness children with severe and moderate developmental coordination disorder. *Research in Developmental Disabilities*, *34*(11), 4222-4231.

Nitoumanis, N., & Vazou, S. (2005). Peer motivational climate in youth sport: Measurement development and validation. *Journal of Sport & Exercise Psychology*, *27*(4), 432–455.

Νόνα, Β. (2004). *Συσχέτιση της παχυσαρκίας με το σύνδρομο αναπτυξιακής διαταραχής σε παιδιά σχολικής ηλικίας 10-12 ετών*. Αδημοσίευτη μεταπτυχιακή εργασία. Πανεπιστήμιο Θεσσαλίας. Τρίκαλα.

Noordstar, J. J., Stuive, I., Herweijer, H., Holty, L., Oudenampsen, C., Schoemaker, M. M., & Reinders-Messelink, H. A. (2014). Perceived athletic competence and physical activity in children with developmental coordination disorder who are clinically referred, and control children. *Research in Developmental Disabilities*, *35*(12), 3591-3597.

Noordstar, J. J., van der Net, J., Jak, S., Helders, P. J., & Jongmans, M. J. (2016). Global self-esteem, perceived athletic competence, and physical activity in children: A longitudinal cohort study. *Psychology of Sport and Exercise*, *22*, 83-90.

Noordstar, J. J., van der Net, J., Voerman, L., Helders, P. J., & Jongmans, M. J. (2017). The effect of an integrated perceived competence and motor intervention in children with developmental coordination disorder. *Research in Developmental Disabilities*, *60*, 162-175.

Ortega, F. B., Artero, E. G., Ruiz, J. R., España-Romero, V., Jiménez-Pavón, D., Vicente-Rodríguez, G., et al. (2011). Physical fitness levels among European adolescents: the HELENA study. *British Journal of Sports Medicine*, *45*(1), 20-29.

Poulsen, A. A., Ziviani, J. M., & Cuskelly, M. (2008). Leisure time physical activity energy expenditure in boys with developmental coordination disorder: The role of peer relations self-concept perceptions. *OTJR: Occupational, Participation and Health*, *28*(1), 30–39.

Raustorp, A., Stahle, A., Gudasic, H., Kinnunen, A., & Mattsson, E. (2005). Physical activity and self-perception in school children assessed with the Children and Youth – Physical Self-perception Profile. *Scandinavian Journal of Medicine & Science in Sports*, *15*(2), 126–134.

Raz-Silbiger, S., Lifshitz, N., Katz, N., Steinhart, S., Cermak, S. A., & Weintraub, N. (2015). Relationship between motor skills, participation in leisure activities and quality of

life of children with Developmental Coordination Disorder: Temporal aspects. *Research in Developmental Disabilities*, *38*, 171-180.

Rodger, S., Watter, P., Marinac, J., Woodyatt, G., Ziviani, J., & Ozanne, A. (2007). Assessment of children with Developmental Coordination Disorder (DCD): Motor, functional, self-efficacy and communication abilities. *New Zealand Journal of Physiotherapy*, *35*(3), 99-110.

Rodrigues, P., Ribeiro, M., Barros, R., Lopes, S., & Sousa, A. (2019). Performance on the movement assessment battery for children: a systematic review about gender differences. *RICYDE. Revista Internacional de Ciencias del Deporte*, *15*(55), 72-87.

Sankar, U. G., & Monisha, R. (2018). Evaluation of cardio-vascular risk in children with developmental coordination disorder in Indian context-pilot study. *Research Journal of Pharmacy and Technology*, *11*(12), 5405-5407.

Sankar, U. G., & Monisha, R. (2019). Life impact of developmental coordination disorder: Qualitative analysis of patient and therapist experiences. *Biomedical & Pharmacology Journal*, *12*(1), 491.

Sankar, U. G., & Monisha, R. (2020). Evaluation of Physical Fitness in Primary School Children with Developmental Coordination Disorder-Pilot Study. *Journal of Pharmaceutical Sciences and Research*, *12*(1), 167-169.

Schoemaker, M. M., Flapper, B., Verheij, N. P., Wilson, B. N., Reinders-Messelink, H. A., & de Kloet, A. (2006). Evaluation of the Developmental Coordination Disorder Questionnaire as a screening instrument. *Developmental Medicine & Child Neurology*, *48*(8), 668–673.

Shahzad, N., & Jameel, H. T. (2022). Physical Activity and Literacy Interventions for Children with Developmental Coordination Disorder: Present and Future Preferences. *Journal of Educational Sciences*, *9*(1), 01-16.

Sigmundsson, H., Hansen, P. C., & Talcott, J. B. (2003). Do 'clumsy'children have visual deficits. *Behavioural Brain Research*, *139*(1-2), 123-129.

Skinner, R. A., & Piek, J. P. (2001). Psychosocial implications of poor motor coordination in children and adolescents. *Human Movement Science*, *20*(1-2), 73–94.

Smits-Engelsman, B. C. M., & Verhoef-Aertssen, W. F. M. (2012). *Functional Strength Measurement – FSM.* The Netherlands: Meteren. http://www.functional-strengthmeasurement-fsm.com/.

Smyth, M. M., & Mason, U. C. (1998). Use of proprioception in normal and clumsy children. *Developmental Medicine & Child Neurology*, *40*(10), 672-681.

St. John, L., Dudley, D., & Cairney, J. (2021). A longitudinal examination of enjoyment of physical education in children with developmental coordination disorder through a physical literacy lens. *Prospects*, *50*(1), 127-139.

Sujatha, B., Alagesan, J., Seemathan, P., & Sadhasivam, S. (2020). Cardiorespiratory fitness in children with developmental coordination disorder. *Biomedicine*, *40*(4), 539-542.

Swain, D. P., Abernathy, K. S., Smith, C. S., Lee, S. J., & Bunn, S. A. (1994). Target heart rates for the development of cardiorespiratory fitness. *Medicine and Science in Sports and Exercise*, *26*(1), 112-116.

Tambalis, K. D., Panagiotakos, D. B., Psarra, G., Daskalakis, S., Kavouras, S. A., Geladas, N., et al. (2016). Physical fitness normative values for 6–18-year-old Greek boys and girls, using the empirical distribution and the lambda, mu, and sigma statistical method. *European Journal of Sport Science*, *16*(6), 736-746.

Thivel, D., Tremblay, A., Genin, P.M., Panahi, S., Rivière, D., & Duclos, M. (2018). Physical activity, inactivity, and sedentary behaviors: Definitions and implications in occupational health. *Frontiers in Public Health*, 6, 288.

Tsiotra, G. D., Flouris, A. D., Koutedakis, Y., Faught, B. E., Nevill, A. M., Lane, A. M., & Skenteris, N. (2006). A comparison of developmental coordination disorder prevalence rates in Canadian and Greek children. *Journal of Adolescent Health*, *39*(1), 125-127.

Tsiotra, G. D., Nevill, A. M., Lane, A. M., & Koutedakis, Y. (2009). Physical fitness and developmental coordination disorder in Greek children. *Pediatric Exercise Science*, *21*(2), 186-195.

Ulrich, D. A. (2000). *Test of gross motor development (2nd ed.).* Austin, TX: PRO-ED.

Van den Beld, W. A., van den Beld, W. A., van der Sanden, G. A., Sengers, R. C., Verbeek, A. L., & Gabreëls, F. J. (2006). Validity and reproducibility of the Jamar dynamometer in children aged 4–11 years. *Disability and Rehabilitation*, *28*(21), 1303-1309.

van der Hoek, F. D., Stuive, I., Reinders-Messelink, H. A., Holty, L., de Blécourt, A. C., Maathuis, C. G., & van Weert, E. (2012). Health-related physical fitness in Dutch children with developmental coordination disorder. *Journal of Developmental & Behavioral Pediatrics*, *33*(8), 649-655.

Varni, J. W. (2005). *Scaling and scoring of the Pediatric Quality of Life Inventory (PedsQL)* Lyon. France: Mapi Research Trust.

Veerman, J. W., Straathof, M. A. E., Treffers, D. A., Van den Bergh, B. R. H., & Ten Brink, T. L. (1997). *Handleiding competentiebelevingsschaal voor kinderen* (CBSK).

Venetsanou, F., & Kambas, A. (2016). Motor proficiency in young children: A closer look at potential gender differences. *Sage Open*, *6*(1), 1-10.

Venetsanou, F., Emmanouilidou, K., Soutos, K., Sotiriou, S. A., Bastida, L., Moya, A., & Kambas, A. (2020). Towards a functional approach to the assessment of daily life physical activity in children: Are the PAQ-C and Fitbit Flex-2 technically adequate? *International Journal of Environmental Research and Public Health*, *17*(22), 8503.

Verschuren, O., Takken, T., Ketelaar, M., Gorter, J. W., & Helders, P. J. (2007). Reliability for running tests for measuring agility and anaerobic muscle power in children and adolescents with cerebral palsy. *Pediatric Physical Therapy, 19*(2), 108–115.

Wall, A. E., Reid, G., & Paton, J. (1990). The syndrome of physical awkwardness. *Advances in Psychology*, *74*, 283-316.

Ward, D. S., Evenson, K. R., Vaughn, A., Rodgers, A. B., & Troiano, R. P. (2005). Accelerometer use in physical activity: best practices and research recommendations. *Medicine and science in sports and exercise*, *37*(11 Suppl), S582-8.

Welk, G. J., & Meredith, M. D. (2008). *Fitnessgram/activitygram reference guide*. Dallas, TX: The Cooper Institute.

Welk, G. J., Laurson, K. R., Eisenmann, J. C., & Cureton, K. J. (2011). Development of youth aerobic-capacity standards using receiver operating characteristic curves. *American Journal of Preventive Medicine*, *41*(4), S111-S116.

Whitehead, M. (2019). Definition of Physical Literacy: Developments and issues. In M. Whitehead (Ed.), *Physical Literacy Across the World* (pp. 8–18). Routledge.

Willoughby, C., & Polatajko, H. J. (1995). Motor problems in children with developmental coordination disorder: Review of the literature. *The American Journal of Occupational Therapy*, *49*(8), 787-794.

Wilson, P. M., Rogers, W. T., Rodgers, W. M., & Wild, T. C. (2006). The psychological need satisfaction in exercise scale. *Journal of Sport & Exercise Psychology*, *28*(3), 231–251. https://doi.org/10.1123/jsep.28.3.231

Wilson, B. N., Crawford, S. G., Green, D., Roberts, G., Aylott, A., & Kaplan, B. J. (2009). Psychometric properties of the revised developmental coordination disorder questionnaire. *Physical & Occupational Therapy in Pediatrics, 29*(2), 184-204.

Winnick, J. P., & Short, F. X. (2014). *Brockport physical fitness test manual: a health-related assessment for youngsters with disabilities*. Human Kinetics.

Woodmansee, C., Hahne, A., Imms, C., & Shields, N. (2016). Comparing participation in physical recreation activities between children with disability and children with typical development: A secondary analysis of matched data. *Research in Developmental Disabilities, 49–50,* 268–276.

World Health Organization. (2018). *Greece - physical activity factsheet*. Geneva, Switzerland: World Health Organization. Ανακτήθηκε από: https://www.who.int/europe/publications/m/item/greece---physical-activity-factsheet-(2018)

Wright, F. V., & Majnemer, A. (2014). The concept of a toolbox of outcome measures for children with cerebral palsy: Why, what, and how to use? *Journal of Child Neurology*, *29* (8), 1055–1065.

Wright, F. V., Chun, C. Y., Mistry, B., & Walker, J. (2018). Evaluation of the reliability of the *Challenge* when used to measure advanced motor skills of children with cerebral palsy. *Physical & Occupational Therapy in Pediatrics*, *38*(4), 382–394.

Wright, H.C. (1997). Children with Developmental Coordination Disorder-A review. *European Journal of Physical Education, 2*(1), 5-22.

Wright, K. E., Furzer, B. J., Licari, M. K., Thornton, A. L., Dimmock, J. A., Naylor, L. H., ... & Jackson, B. (2019). Physiological characteristics, self-perceptions, and parental support of physical activity in children with, or at risk of, developmental coordination disorder. *Research in Developmental Disabilities*, *84*, 66-74.

Wu, S. K., Lin, H. H., Li, Y. C., Tsai, C. L., & Cairney, J. (2010). Cardiopulmonary fitness and endurance in children with developmental coordination disorder. *Research in Developmental Disabilities*, *31*(2), 345-349.

Yu, J., Sit, C. H., Capio, C. M., Burnett, A., Ha, A. S., & Huang, W. Y. (2016). Fundamental movement skills proficiency in children with developmental coordination disorder: does physical self-concept matter?. *Disability and Rehabilitation*, *38*(1), 45-51.

Zoia, S., Castiello, U., Blason, L., & Scabar, A. (2005). Reaching in children with and without developmental coordination disorder under normal and perturbed vision. *Developmental Neuropsychology*, *27*(2), 257-273.

Zwicker, J. G., Missiuna, C., Harris, S. R., & Boyd, L. A. (2010). Brain activation of children with developmental coordination disorder is different than peers. *Pediatrics*, *126*(3), e678-e686.